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Reagan, Louis L.

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COMMUNICATION EFFECTIVENESS IN THE SUBMARINE FORCE, U. S. PACIFIC FLEET

LOUIS L. REAGAN

COMMUNICATION EFFECTIVENESS IN THE SUBMARINE FORCE, U. S. PACIFIC FLEET

by

Louis L. Reagan

Lieutenant, United States Navy

Submitted in partial fulfillment of
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IN

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And most important, my thanks go also to Lynn Ann who lent herself so cheerfully to the deadly dull task of transcribing, and checking, over 47,000 separate numbers in their transition from survey responses to computer input; this in addition to the loyal understanding and encouragement she can always be counted upon to provide.

LLR

ABSTRACT OF RESEARCH REPORT

ON

COMMUNICATION EFFECTIVENESS

IN THE

SUBMARINE FORCE, U. S. PACIFIC FLEET

Having observed the friction periodically occurring at the interface between the staffs and fleet operating units, it was the purpose of the student to uncover any evidence symptomatic of the nature of the problem, if there were one. It was hypothesized that if there were substantial disparity in the meanings to officers in the Force of certain words in common usage then day to day interpersonal communication effectiveness would suffer. And, if the level of communication effectiveness were low it would indicate that inversely proportional levels of frustration, confusion, and heterogeneous behavior would detract from the ability of the organization to perform in an optimal manner.

The meanings of fifty concepts to a sample of sixty-four officers were measured by the Semantic Differential, a highly reliable device with high face validity. The set of measurements for each officer was compared to that of every other officer, yielding a total of 2,016 comparisons, and counts were made in each comparison of the number of concepts out of fifty whose deviations in meaning fell into ranges of communication effectiveness or deficiency. In addition, counts were made of the number of times the deviations in meaning for each concept fell into the same ranges.

Results showed that on the average, for the fifty concepts used, any two officers were able to communicate effectively with each other on about twenty-two, less than half. And, on the average, serious obstacles to communication existed on about eleven out of fifty, more than a fifth. In addition, it was found that on the average communication effectiveness existed for each concept in about 44% of the comparisons while serious obstacles to communication existed in about 22%.

Presentations of results included breakdowns according to the positions in which officers were serving or had served, their educational preparation for staff duty, their ranks, and the sources of their comissions. The results for the individual concepts were tabulated and they were rank ordered according to their relative levels of effectiveness or deficiency.

It was concluded from the results that an interpersonal communication problem definitely does exist in SUBPAC which, while not necessarily being a problem source, could be expected to impede effective interaction of personnel. It, therefore, seems probable that the demonstrated level of general communication effectiveness is sufficiently low to fully prevent optimal performance of the organization as a whole.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

BACKGROUND

"I think of an officer attached to a staff as a fink," was one answer received.

"I have never been able to understand why it is that an otherwise outstanding officer, whose shipboard career was a complete success, can subsequently go to a staff and thereafter be wrong 90% of the time," is another statement that has been heard.

One only need serve aboard an operating submarine a brief period of time before other similar remarks will be heard; at least such is the experience of this writer. Wardroom discussions dwell long and hard on the subject of staff activities. Allegations run the gamut from "empire building" to sheer incompetence. Often levelled is the charge that one hand of a staff is working at cross purposes to the other. And so forth. No assertions of truth or validity are intended here, only that such words, for whatever reason, are spoken.

Common sense suggests several explanations for such behavior. It may be a case of harmless rivalry. Or a man may find tension release in railing an absent scapegoat with no real involvement of emotions or conviction of the absolute truth of his statements. One may have incorrectly generalized from a known, but isolated, staff deficiency and now looks upon all other activities with a tainted view. It may be that junior officers functioning in positions of ascendant authority are resented. Real understanding of the purposes and contribution of the staff may be lacking. Or, it may be that such observations are justified.

Then there is the other side of the staff-ship interface.

Insufficient personal experience rules out the presentation of examples of like behavior on the part of staff officers. However, it would seem to hold, intuitively, that since each of the organizational groupings is involved with tasks and procedures peculiar to itself (relative to the other), faces different pressures and circumstances, and aims at different suboptimal goals, the fact that one side reacts negatively to externally generated frustrations attributed to the other, implies that the other would tend to act similarly. But even though this may be a one sided affair, that apparent antipathy exists at all is worthy of attention and study.

The important question concerns whether or not a problem really exists. Even though a speaker may not be in earnest, might not his words influence the neophyte and thereby create an unfortunate frame of mind in him? Is apparent animosity and bitterness real and deep enough to prevent clear thinking and unbiased judgment? Does a lack of understanding of the staff function on one, the other, or both sides detract from the ability of any parties to perform to the best advantage of the organization as a whole? Does diverse thinking hamper full cooperation and communication between the two sides of the interface? An affirmative answer to any of these questions can be assumed to indicate the presence of problems.

The purpose of this study then is to attempt to detect the presence of factors deleterious to optimum functioning of the organization. As is true of all human research the first order of business is to determine which aspects of the subject field will admit of some kind of measurement, followed by the selection of some instrument by which measurement can be made.

In the present case it was felt that regardless of the attitudes of

any protagonists, or their ostensible behavior, no major problem exists unless such attitudes and/or behavior result in damaging the effectiveness of relations between the groups to the point that the conduct of official business is affected. Due to the nature of the subject, short of exhaustive and large scale investigations, it is seen that description of any such problem in exact terms would be difficult indeed.

For one thing, there are no established standards by which the effectiveness of dealings between ship and staff officers can be measured. A study of the directives of the staffs in the Submarine Force, Pacific Fleet showed that, while formal organizations and duties are well provided for, no structures or guides for external contacts are included. And since a large amount of a staff officer's time is devoted to direct dealings with ship-board personnel heavy reliance is placed on effective functioning of an informal organizational pattern. It may be that no substitute or addition can either replace or complement the present system of depending upon the independent judgment and discretion of personnel on both sides in bridging the gap between these separate organizational entities. This in itself may be worthy of some future enquiry.

Due to the difficulty of defining a problem per se it was necessary to attempt a different approach. It was felt that if any facet of the enviroment of or channel for the interplay between the two groups were found to be deficient then the presence of a more substantial problem could be inferred. The facet decided upon was communication, for two reasons. First, there is no requirement more universal to the operation of any organization than that of effective communication. Unless there is a general capability among personnel to transmit information, whether by word of mouth, letter, or radio telegraph, with clear understanding

from one to another then coordination and performance are bound to suffer. Commands, instructions, and reports must have the same meaning to recipients as was intended by the originators if the desired effect upon behavior is to occur. And, those statements must have the same meaning to all recipients if they are to act in concert upon them. Any misconceptions or diversity in perceptions of the structure of the organization, its body of rules, its methods, and its goals can easily establish the basis for a falling out among officers such as that described above.

The second reason for choosing the field of communications is the fact that an appropriate instrument exists which, by experimental research in its use, has been found adaptable to this type of measurement. The instrument referred to is the Semantic Differential technique for the measurement of meanings, perfected as explained at length in The Measurement of Meaning by Charles E. Osgood, George J. Suci, and Percy H. Tannenbaum.[1] In addition, a method of determining communication effectiveness from the results of semantic differential measurement, developed by Triandis in 1960,[2] is also available. Both of these techniques as well as adaptations invented for and tested in this research are discussed in detail in Section II.

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[1](Urbana, Illinois, University of Illinois Press, 1957), pp. 1-29.

[2]Harry C. Triandis, "Some Determinants of Interpersonal Communication," Human Relations, May 1960, p. 279.

BENEFITS OF RESEARCH

The questions may arise: why bother to research this field? The system has worked in wartime, hasn't it? The job gets done, doesn't it? What else is necessary? To which the best answer is discussion of possible benefits.

First, it is hoped that a study will provide an answer to the basic question - does a problem exist? The results must be one of three alternatives. There are problems; the results are inconclusive; or, no problems are indicated by an analysis of communication effectiveness. In the event of the last, then the benefit will be the firm closing of the door on one blind alley - a not inconsequential event. Should the results be inconclusive then steps taken should be reviewed to find their shortcomings, whether inherent in the approach or attributable to external causes - an event of no immediate benefit to anyone. However, should it be found that there are problems, then further steps can be taken to define and eliminate them. Since it is evident that no activity involving many people can be wholly without complications it is anticipated that any efforts which yield answers about them will be beneficial.

Regardless of which alternative prevails at least four groups of people can benefit from the general knowledge yielded by this research in at least four different ways. Those in positions of authority superordinate to the area of focus may learn more of the organization they administer. The officers directly engaged at the point of interface may learn more of the enviroment in which they exist. Newcomers to the organization may find themselves better able to cope with the adjustments they must make as they gradually shoulder their shares of the burden of

responsibility and adapt themselves to their new enviroment. And, other organizations with similar structural interfaces may discover new questions to be asked about the effects on performance caused by whatever conditions prevail within their own bailiwicks.

How may the results benefit these groups? They may show the need for changes or additions to present organizational schemes, content of preparatory training, and indoctrination procedures; i.e., the preparation and presentation of more information on how activity and operations can be guided. Officers in all groups newly cognizant of conditions and their influence upon those conditions may find themselves better able to adapt to reality. The results may also indicate to all the existence of other facets of the organization which could favorably benefit from additional attention. And, finally, those groups listed above as well as other unassociated interests (viz, psychologists, sociologists, business, etc.) may benefit from a test of the value of the data gathering and analysis techniques utilized, from which inferences of their suitability in the making of further studies can be developed.

DEFINITIONS OF KEY TERMS

Definition of key terms is, for ease of presentation, separated into two parts. The first part contains terms used in the text of this report. The second defines those terms used in the survey, described in Section III, which may be ambiguous to either the respondents to the survey, and other similarly oriented officers, or readers (military or civilian) unfamiliar with special meanings attributable to usage in military and/or submarine contexts.

Behavior[3] is the form of nervous, muscular, and emotional response of an individual to internal or external stimuli, not limited to manner of overt conduct.

Coding is the process by which an individual translates the meaning of an idea or intention which he seeks to communicate in some form of information-bearing transmission. For example, he thinks of what he means and selects the word(s) or phrase(s) he considers proper for expressing himself. The reverse of this process is decoding - the translation of a **word** (sign) received into its meaning to him.

Communication Effectiveness is the efficacy with which the behavior of a person or persons may be shaped as a result of the transmission of ideas and/or intentions of an originator through the media available; viz, the written or spoken word.

Meaning, as per Osgood[4], is "that process or state in the behavior of a sign-using organism which is assumed to be a necessary consequence of the reception of sign-stimuli (words, pictures, etc.) and a necessary antecedent to the production of sign-responses."

Mediating Processes are conceived as being those types of mental activity which link stimuli, internally or externally generated, with associated responses. For example, thinking can be looked upon as the sequential stepping of stimulus and response associations with responses, evoking new stimuli and associated responses, each operation linked to the others being a mediating process.

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[3]Definitions taken from Funk & Wagnalls Standard Dictionary of the English Language (New York: Funk & Wagnalls Company, 1963)

[4]Op. cit., p. 9.

Response is that behavior elicited by the occurrence or perception of a stimulus, sign, or symbol and may take the form of an overt reaction or merely be a sequence of mental processes.

Sign[3] is any distinctive mark by which a thing may be recognized or its presence known, and may be accidental or intentional, natural or artificial, suggestive, descriptive, or wholly arbitrary. It is by means of signs that stimuli may be perceived and as such a sign is a stimulus.

Significate is that object, event, or meaning indicated by a given sign.

Stimulus[3] is any agent or form of excitation which influences the activity of an organism as a whole or any of its parts. That is, anything whatsoever perceived through the senses or mental processes which as a result of that perception evokes some sort of tendency toward a particular pattern of behavior, whether resultant in the form of overt or strictly mental activity.

Symbol is any sign chosen to stand for or represent something else. The letters s,h,i, and p when put together form the word SHIP, a symbol, a sign which stands for the large waterborne vessel or vehicle it is known to be.

PART B

By Direction is a device by which a properly authorized person may sign his own name to an official document in lieu of the official in whose name it is written.

CasRep stands for Casualty Report and is a message transmitted for the purpose of notifying appropriate parties that certain casualties

have occurred (equipment, systems, etc.) which limit the operational characteristics of a ship.

Command may be taken two ways. One, it is a duty assignment as Commander or Commanding Officer of a ship, tactical unit, or activity. Second, it is a directive ordering the accomplishment of a given task.

Commitment is an officially scheduled evolution or activity for which a ship or other organizational unit is required to make preparations and then accomplish.

Communication may be taken two ways, One, it is any act, through any media, by which any information of the ideas and/or intentions of one person are to be transmitted to another. Second, in strict sea going usage, it is transmission via standard channels (electronic, visual, and mail) of tactical and administrative information usually in the form of commands (directives), reports, formal requests, etc. While it is felt that the latter meaning was that which would occur to the respondents to the survey through which this research was conducted, it is the former definition which is included in the term "communication effectiveness".

Completed-Staff-Work is the output of a staff officer which is so thoroughly prepared, so well integrated with all facets of a given staff, and so correct in presentation that upon submission to the Commander served by the staff all that superior need do is approve or disapprove knowing he has in hand every available bit of information necessary to make such a decision.[5]

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[5]NWP 12, The Navy Staff (Washington: Government Printing Office, 1960), pp. 3-9.

Control is the means by which a decision maker may insure that any activity, procedure, or policy placed in effect is receiving compliance or is performing in the desired manner, with rapid feedback of information regarding deviations calling for attention, such that the optimal achievement of an initial objective is assured.

Crisis is any situation which either develops unexpectedly or has deteriorated to the point that extraordinary attention must be given it, usually to the disadvantage of other considerations, lest organization-wide and/or suboptimal objectives be jeopardized.

Jury Rig is an expeditious repair of machinery, equipment, or a system which due to necessity violates design specifications or arrangements made such so as to more rapidly restore operation on a temporary basis; usually due to a lack of proper repair parts, equipment, or time.

OpTar stands for Operating Target, a budgeted amount of funds allowed a ship or other activity for the purpose of procuring repair parts and consumable materials necessary for routine operations.

Specialization in Navy line officer context usually refers to an activity, subordinate to the main goal of proficiency in command, in which a certain level of expertise is sought and attained and which is exercised during periodic tours of shore duty.

CHAPTER II

DISCUSSION OF THE SEMANTIC DIFFERENTIAL

The semantic differential is a technique by which the meanings of words/concepts to individuals can be measured. Use of this technique implies the adherence to a particular conception of the meaning of the "meaning" itself. A brief discussion should make this clear.

Imagine a naive human being coming into contact with a rock (a stimulus) for the first time. What he learns of the rock will become its meaning to him. Looking at it he becomes aware of it by the act of seeing it, which is a response to it. It is thus a stimulus to which he responds; pictorially:

$$\underset{\text{Stimulus}}{S} \longrightarrow \underset{\text{Response.}}{R}$$

If it falls on him or he stubs his toe upon it he may react in pain. Now the stimulus is a falling or impacting rock and his response, feeling it, is accompanied by pain which causes him to withdraw from it and/or fear it, other responses.

These responses reinforced by the pain are, therefore, learned and will recur with lesser intensity the next time a falling rock or rock in the path is perceived. He has formed an association between them and pain,

$$S \longrightarrow r_m \longrightarrow s_m \longrightarrow R_2,$$

where r_m is some part of the original response which has now been learned and calls forth s_m, fear of what has been learned, which causes R_2, any activity designed to avoid a recurrence of either being hit by or stumbling on the rock.

Later, curious or hungry, he may try a bite. He may drop it and then learn to throw it. With each step he may experience some form of reward or punishment which he will associate with it. Hurt teeth, tastelessness, satisfied curiosity, a fallen prey are examples of these. As he forms the various associations between the rock, the stimulus, and the responses he makes to it he is formulating its meaning to him. With each reinforced experience a portion of the association made will be remembered. Then with each subsequent contact with the rock the full chain of $r_m \longrightarrow s_m$ processes will occur. This pattern is the behavior which the rock-stimulus elicits and is the meaning of the rock to the individual.

At this point, what if the human being were to see a picture of the rock? The chances are that this new stimulus would call into play much of the same behavior as the rock itself and so the picture would have meaning to him. This picture then is a sign of the rock, the significate.

Now assume that the individual is capable of using the English language to label objects such as rocks. The word "rock", however, in print is but a combination of letter forms which are nonsense unless the key to their use is learned and understood. Spoken, it is a combination of physical sound waves which are nonsense unless their pattern is learned. Neither way is the word a rock. But if the man were to see and hear the word contiguously with experiencing the behavior elicited by the rock and was so encouraged to learn that the word stood for the rock then he would form an association between the two. The word would take on the ability to cause a part of the original $r_m \longrightarrow s_m$ sequence of behavior and thereby come to have a meaning similar to that of the rock.

In other words, the word-stimulus produces a small portion of the

original reaction which by association with that original response is actually a disposition to behave in a manner similar to it. This fractional response internally generates the stimulus which leads to the secondary response, the ultimate behavior caused by the word. Such a sequence ($r_m \longrightarrow s_m$) is understood to be a representational mediation[6] process; representational because r_m is representative of the original response, and mediational because the internally generated s_m leads to the final response behavior. Thus the word becomes a sign for rock.

To generalize, "A pattern of stimulation (a word) which is not the significate is a sign of that significate if it evokes . . . a mediating process, this process (a) being some fractional part of the total behavior elicited by the significate and (b) producing responses which would not occur without the previous contiguity of non-significate and significate patterns of stimulation".[7]

To simplify, the total process can be broken down into two steps: decoding and encoding. Pictorially,

$$\underbrace{\text{Sign} \longrightarrow r_m \longrightarrow s_m}_{\text{Decoding}} \longrightarrow \text{Response},$$

decoding takes place when the sign is received and triggers the pattern of mediating processes $r_m \longrightarrow s_m$; i.e., its meaning. As some form of instrumental behavior (action undertaken for some purpose) should become necessary, then there is encoding of the pattern of mediating processes which will produce a final response, thus

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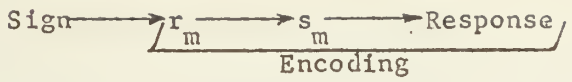
[6]Once again, mediating processes are the linking of internally generated r_m's and s_m's which result in patterns of thought, action, or any other forms of behavior.

[7]Osgood, etal, op. cit., p. 7.



Hopefully, it has been made clear that the experience of an individual with a stimulus-significate will have an important effect on what its sign will mean to him. Whereas the r_m of a mediating process is a fractional part of an original total response and represents it, therefore it can be seen that the meanings that different individuals have for the same words (signs) will vary just as their behavior toward the thing signified has varied. It is the effect of this difference which the semantic differential seeks to measure.

Taking the word ADMINISTRATION, a sign-stimulus, it has been shown that upon perceiving it a subject decodes it into its meaning to him. Then he is presented with additional stimuli, a bipolar, adjectival scale such as GOOD-BAD; is asked to judge where upon that scale ADMINISTRATION fits; and, is given a continuum, with seven discrete subdivisions, upon which to mark:

GOOD:____:____:____:____:____:____:____:BAD.
(Scored as (1) (2) (3) (4) (5) (6) (7))

If he is cooperative, his behavior may be described as follows. He decodes the word ADMINISTRATION into its meaning to him and then attempts to encode it in terms of the scale. To do this he must also have decoded the signs of the scale such that their meanings are co-mingled with thought processes of ADMINISTRATION. When he marks a selection the result is some measure of his total response to the combination of stimuli and is conditioned by his experience with them, as per reasons set forth above.

The list of adjective scales may be extended to any length thereby increasing the number of dimensions[8] in which measurements are made.

The marks of a subject will then yield a profile of meaning for the key word. By having numerous subjects perform the same operations the measurements will produce individual profiles which may be compared to derive indices of the differences of meaning the same word may have to them. Practice has shown, however, that the number of scales need not be too long for most purposes.

To recapitulate, the meanings of various stimuli to an individual evolve as a result of his experience with them. Word-signs are associated with stimuli, be they real or conceptual, and derive their meaning from the individual's response behavior to the stimuli-significates. The response to a word-stimulus is a fractional part of the original behavior elicited by the significate, referred to as a representational mediating process, and is to him the meaning of the word. He arrives at this meaning through decoding from the form in which he receives it into its meaning. When he would seek to transmit a conceived meaning he must encode it into the form of some word-sign which he perceives as a symbol for that meaning.

It is the aim of the semantic differential to measure in various dimensions the meaning of a word to an individual by stimulating him with words to be measured and adjective word scales anticipating that he will decode them all into their respective meanings to him and then encode the meaning of the key word into terms of the scales. The use of a multiplicity of scales produces a profile of meaning indices which are unique for a specific key word for a given individual and which may be compared to the identically produced profiles of others.

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[8] Interested readers may wish to consult Osgood, et al, The Measurement of Meaning for a thorough discourse on the "Dimensionality of the Semantic Spare," and the use of adjective scales for measurement purpose.

DISCUSSION OF COMMUNICATION EFFECTIVENESS MEASUREMENT

Now, how can this device be used to measure communication effectiveness? A basis for such a measure was developed as a result of a study performed by Dr. Harry C. Triandis,[9] of the University of Illinois, in 1960; **précis** here to follow.

A group of thirty college students was administered a semantic differential comprised of ten concepts to be measured on fourteen, seven point scales each. This was the encoding stage. The results were tabulated and analyzed. A short time later twenty-eight of the students were each given a specially prepared set of sixty profiles, minus the key words for which they stood, to be decoded into one of three possible multiple choice answers. The profiles were those of other students involved in the study, which were similar to the decoders' in certain respects and different in others, as well as some of each student's own responses from the initial session. It was hypothesized that if the decoder's profile for a given concept were similar to that of the person who had encoded it then he would show a high degree of success in matching the profile to the correct one of the three answers, which was the word for which the encoder had produced the profile; and, vice versa. In other words, a test was made of how effectively an encoder could communicate with a decoder using the semantic differential as a medium, depending upon the relative similarity of the two individuals' initial profiles, termed "cognitive similarity".

It was found, with a high level of significance, that the smaller the average deviation of the scale responses between two subjects for

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[9] Triandis, op. cit., pp. 281-285

a given concept the greater the likelihood that the decoder would choose the correct answer. This finding was greatly substantiated by the fact that individuals were highly successful at unknowingly decoding the profiles which they themselves had made at the initial session.

The Triandis Study was much more involved than has been indicated and yielded more results than need to be described here. The most important, however, was the determination that if the average deviation, for two subjects, on the seven point scales (as used in this research) for a concept were no more than 1.20 then those subjects would be able to communicate very effectively in the use of that concept. If the average deviation were equal to or greater than 1.70 then communication effectiveness would be seriously reduced. It is upon these figures that the project herein reported is based.

CHAPTER III

CONDUCT OF THE RESEARCH

The research method employed in this study was restricted to the gathering of empirical data by means of a questionnaire and semantic differential measurement of meaning survey of a set of words, abstract concepts, and phrases. In the transmittal solicitation care was taken to arouse no misconceptions about the study or its techniques (although a number did take place) in the hope that responses would be free of unintended influences.

The questionnaire was composed of fifteen multiple choice questions. These were arbitrarily but randomly composed and were not designed to lead to any specific point. That there should have been any right or wrong answers was not intended and in most cases not only was a best response difficult to select but it was also equally as difficult to point out even one wrong or least correct choice. So it was not a test but rather a means of gathering responses which had been deliberately and consciously made.

The semantic differential was comprised of fifty terms each to be measured on the same set of twelve, seven point, bipolar adjectival scales. The terms included were selected from a list of about four hundred terms found used in the staff directives of numerous staffs, some of the literature of military staffs, NWP 12 - The Navy Staff, some of the literature of organizational administration, and the experience of this writer. They were chosen on the intuitive basis that they either are or should be in common use by the group of officer-subjects of the study. Presented alphabetically, the words and phrases used are as follow:

Administration	Mistake
Authority	Motivation
Bureaucracy	Operations
By direction	OpTar
Career	Organization
CasRep	Plan
Command	Policy
Commitment	Power
Communication	Promotion
Complete Staff Work	Readiness
Control	Report
Coordination	Reprimand
Cost	Reputation
Crisis	Responsibility
Directive	Sea Duty
Duty	Seniority
Estimate	Shipboard Casualty (Equipment)
Goals	Specialization
Higher Authority	Staff
Incompetence	Staff Officer
Individuality	Supply Officer
Inspection	Team
Jury Rig	The Future
Liaison	Training
Line Officer	War

The twelve scales were chosen from a list compiled by Osgood, et al, in Measurement of Meaning[10] and rated as among the most effective for such measurement purposes. Adjective scales such as these have been carefully established, as has their polar opposition, by long and thorough analysis as described in Osgood, et al. The format of these scales was as follows:

GOOD:____:____:____:____:____:____:____:BAD
WEAK:____:____:____:____:____:____:____:STRONG
FAST:____:____:____:____:____:____:____:SLOW
UNFAIR:____:____:____:____:____:____:____:FAIR
LARGE:____:____:____:____:____:____:____:SMALL
DULL:____:____:____:____:____:____:____:SHARP
BEAUTIFUL:____:____:____:____:____:____:____:UGLY
LIGHT:____:____:____:____:____:____:____:HEAVY
PASSIVE:____:____:____:____:____:____:____:ACTIVE
CLEAN:____:____:____:____:____:____:____:DIRTY
DELICATE:____:____:____:____:____:____:____:RUGGED
HOT:____:____:____:____:____:____:____:COLD

Relative to each other, the adjectives of a scale generally tend to

[10] Osgood, et al, op. cit., p. 37, "Analysis I Rotated Factor headings, Table I.

carry opposite charges, positive or negative, or slants; positively charged are GOOD, STRONG, FAST, FAIR, etc, as opposed to the negatives BAD, WEAK, SLOW, UNFAIR, etc. Therefore, to be sure that respondents did not develop a set as they moved from one to another the scales were alternated from positive to negative on the left and right hand sides respectively. It has been shown in Osgood, et al, that results would not be significantly influenced if this were not done so it amounted to little more than an insurance measure.

One of the problems in selecting scales is choosing ones that are compatible to the nature of the concept to be measured. In this study is was found that the last three scales provided very few responses other than the meaningless middle. To prevent them from neutralizing the quality of the other scales they were deleted from the set and analyses were based on the results of scales one through nine, which proved quite satisfactory.

Despite the awareness of subjects responding to the semantic differential the technique actually involves the interplay of such fundamental component parts of the thinking process that determinative behavior is largely below the level of consciousness. In a sense, then, the decoding-encoding sequences are basically unconscious. Accepting this, the combination of questionnaire-semantic differential provided both conscious and unconscious sets of data. It was hoped that correlating the two would yield some interesting results.

Questionnaire-survey packages were sent to two hundred and three officers currently serving, or recently having served, in the Submarine Force, U. S. Pacific Fleet. This list was compiled by selecting at random, among the staff and fleet operating units, from the Roster of Officers of that Force. Selection was based on proximity to the ship-staff interface;

the ranks of Captain, except for Division Commanders, and above were left unmolested; and, those not designated "Qualified in Submarines" were generally avoided. This last constraint was used since it was felt that the officers in this category were relatively less likely to experience extended career involvement with the Submarine Force.

In addition, the choices were designed to yield a sample somewhat representative of the officer rank-functional assignment composition of the Force. This manipulation was not carried to extremes but rather amounted to little more than a consideration kept in mind during the selection stage.

Of the two hundred and three solicitations, a total of one hundred and twenty were returned (59%), which for this type of endeavor can be considered a very favorable response. Twenty of the returns were unusable due to apparent lack of understanding of what was desired on the part of some and lack of cooperation on the part of others which resulted in some of the concept measurements showing the effects of bias.

Due to computer data storage limitations it was necessary to limit the sample size to sixty-four. So from the one hundred good returns thirty-six were randomly picked out and set aside. The breakdown of the sample which resulted is as follows:

Presently serving on staffs	22
Presently serving on ships	42
	64

Presently serving as Division Commanders	6
Presently serving as ship Commanding Officers	15
Presently serving in other staff capacities	16
Presently serving in other shipboard capacities	27
	64

Have some staff duty experience	39
Have no staff duty experience	25
	64

Have some advanced education pertinent to staff duty	14
Have no advanced education pertinent to staff duty	50
	64

Captains and Commanders	13
Lieutenant Commanders	21
Lieutenants and Lieutenants (Junior Grade)	30
	64

Naval Academy	39
All other sources	25
	64

LIMITATIONS OF THE SAMPLING USED

It will be wise to note at the outset these characteristics of the sample, the population from which it was drawn, and the treatment given it which may detract from the ability to generalize about the results. These points while not of a disqualifying nature are made to aid the judgment of the reader in his thinking about the problem under study and to suggest boundaries beyond which he ought not go.

First, this study began in a form which attempted some measurement among some members of the total population of officers in the Submarine Force, Pacific Fleet,. However, neither before nor after the measurement was the actual state of the entire population known - only that of the sample. Inasmuch as the size of the population changes from day to day, that parameter is unknown, and no attempt was made to approximate it.

The sample itself may bear the effects of any unconscious biases of this writer. Selecting sixty-four valid returns from among one hundred and twenty was largely an arbitrary process. In most cases the decision was clearly warranted due to the failure of respondents to grade the scales for all concepts properly. Some graded the first few and then placed a large X through the middle of the remainder. One apparently looked at what was asked of him, made a quick judgment, wrote "RIDICULOUS"

across the first page, and mailed it in. Others placed a mark on only one scale per concept.

More questionable were those returns excluded because the preponderance of marks for all concepts were at the midpoint of the scales. These were decided against because it was felt that a cooperative respondent would not find so little meaning in so many different words. In other cases, the remarks made by the respondents regarding what they were thinking of while doing the semantic differential indicated that the measurements could only have been seriously prejudiced. For example one person explained that he had tried to judge on the scales the manner in which the various concepts were contributory to the operation of the Submarine Force rather than their meaning to him.

The method of analysis was based upon some assumptions whose validity has not been proven conclusively. The measurement of communication effectiveness by semantic differential as a technique derives from a study in which the measuring instrument was itself the medium of communication. It may be, then, that the results cannot be extrapolated to other media. It was assumed, nevertheless, that what is true of one is indicative of what is true of another medium.

In the analysis it was assumed that within certain ranges communication would be very effective, satisfactory, or seriously affected. It is emphasized that "seriously affected" does not mean that no communication can take place. It can. But it must either be effective or something less than effective; and, since excellence is always a goal, it is at that level that attention here is focused.

ANALYSIS OF DATA

In an effort to uncover any indications that the semantic differential could be used to predict overt behavior, this study, as was mentioned above included the gathering of both conscious and unconscious responses from the officers solicited. These could then be subjected to a correlation analysis which, though not used to demonstrate a cause and effect relationship, would at least show a tendency of conscious and unconscious behavior to vary proportionately.

To do this, every subject's responses to the questionnaire and semantic differential were compared with those of each of all the others. With a sample size of 64 this resulted in a total of 2,016 such comparisons. For a comparison, the difference between the responses of the subjects for each of the nine scales of concept were taken and averaged, yielding the average deviation (AVDEV) for that concept. This being done for all concepts, then provided a total of 50 AVDEV's per comparison. The AVDEV's were then totaled according to three criteria, any one of which could range from 0 - 50 as follow:

DT1 - equal to or less than 1.20 (very effective communications)

DT2 - equal to or less than 1.40 (satisfactory communication)

DT3 - equal to or greater than 1.70 (deficient communication)

The second criterion is a modification made to reduce the stringency of the Triandis results as applied to this study. It was assumed that some portion of the range between 1.20 and 1.70 would include a zone of effectiveness-level conceived to be more effective than ineffective. Somewhat arbitrarily then, the two numbers were averaged $(1.2 - 1.7)/2 = 1.45)$ and rounded to the 1.40 figure which slightly weighted the "effective" end of

the range. It is the total AVDEV's falling in the range of the DT2 criterion which provides the "score" for the comparison of semantic differentials to be used in the correlation analysis.

Then the number of questions which two compared individuals had answered the same were totaled and this score was labelled QT. At this point a comparison resulted in a plot point with coordinates DT2 (X axis) and QT (Y axis).

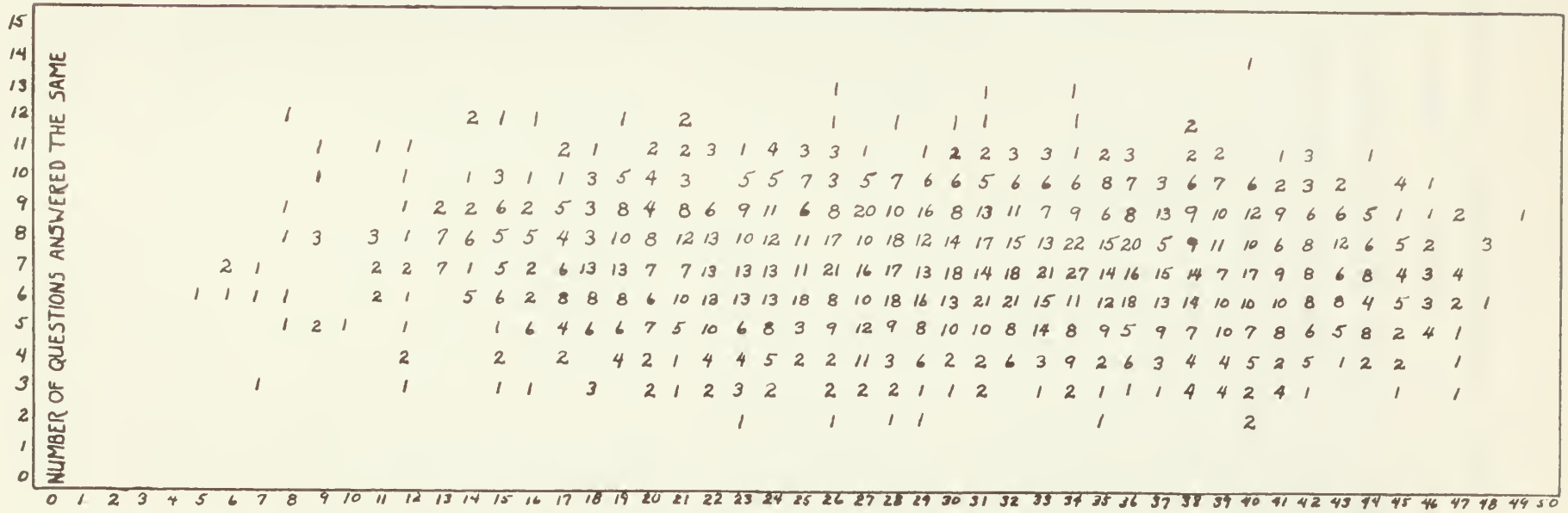
The correlation matrix into which the 2,016 comparison results accumulated had dimensions on the X axis of 51 colums (0-50) and 16 rows (0-15) on the Y axis with a total of 16 X 51 = 816 cells. The matrix which was produced is shown in Figure 1 .

The object of the next process was to determine the levels of communication effectiveness which existed in the various sub-groups of the sample, as listed on page 21 . In addition, effectiveness levels were measured on an inter-group basis. That is, those on staff duty were compared with each other; those on shipboard duty were compared with each other; those on staff duty were compared with those on shipboard duty; and so on with each of the five other classifications of sub-groupings.

The information necessary for these determinations was compiled by comparing responses to the semantic differential in the same manner as for the correlation analysis. Now, however, the criteria used were the $\leqq 1.20$ and $\geqq 1.70$ figures, DT1 and DT3. This permitted the computation of average effectiveness (DT1) scores among and between sub-groups with descriptions of the distribution of scores about those averages. The same type of information was developed for communication deficiency scores (DT3's).

During the course of the two preceding stages of analysis, for each

CORRELATION MATRIX FOR DT2 AND QT



NUMBER OF AVERAGE DEVIATIONS EQUAL TO OR LESS THAN 1.40

FIGURE 1

set of comparisons, whether overall or in sub-groups, compilations of the number of AVDEV's which fell within the DT1 and DT3 criterion ranges were made for each of the fifty concepts. This was done to point out the words and phrases which could cause the least and the most amount of trouble when used between people in various contexts.

CHAPTER IV

JUDGMENTAL CONSIDERATIONS

At this stage, before being confronted with the results, one must establish for himself the level at which existing communication effectiveness ceases to be acceptable. In other words, upon how many concepts out of a total of fifty ought there be substantial agreement to satisfy the minimum requirements for proper interaction among personnel in the organization? Should there be effective communication on 90%? 75%? Or only 50%? It is for the user of the information reported to establish such a criterion.

From another angle, for any single concept, what is the minimum acceptable percentage of substantial agreement which ought to accompany its use? This criterion may vary from word to word depending on relative sensitivity but it is conceived that there may be some cut-off point for any commonly used term.

Switching to more negative aspects, one must also establish the maximum tolerable level of deficient communication. What, then, is the maximum percentage of substantial disagreement which can be tolerated in existing communications? Upon how many concepts out of a total of fifty may there be deficient communication without there being serious obstacles to effective inter-action of personnel? And, for any single concept, what is the maximum percentage of substantial disagreement which may be permitted to accompany its use? It is not the place of the writer to ordain such standards so the discussion will center on the low level of one-half, 50%.

STATISTICAL CERTAINTY

Since the purpose of this study was to develop inferences of the status of the entire population of officers in SUBPAC and results were to be generalized rather than aimed at proving any specific point no hypothesis testing was to be included. It was therefore necessary to determine whether or not the size of the sample was sufficiently large to represent that population. According to statistical theory,[11] a sample of size sixty-four can be considered to create, with a 95% level of confidence, a cumulative distribution within plus or minus seventeen percentage points of whatever the cumulative distribution of the population happens to be for the measurements being made. With a subject as sensitive as that of this study, such a confidence interval is considered to be too wide.

However, where each of the members of the sample is compared to all of the others a total of 2,016 comparison take place. Of these comparisons a new sample is created which is drawn from all of the comparisons which would be made among the members of the population as a whole. So the sample size becomes 2,016 rather than 64. Again, according to statistical theory,[12] it can be shown that a sample of size 2,016 is 95% certain of yielding a cumulative distribution which will fall within plus or minus three percentage points of whatever the cumulative distribution of the population happens to be for the measurements being made. Based on this level of certainty and narrow margin for error, the ensuing discussion of sample results will be considered to apply also to the population as a whole.

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[11] Wilfrid J. Dixon and Frank J. Massey, Jr., Introduction to Statistical Analysis (New York: McGraw-Hill Book Company, Inc., 1957), p. 292.

[12] Ibid.

RESULTS

Correlation Analysis

The analysis of correlation between the distributions of DT2's and QT's resulted in a coefficient of -.0327, virtually no correlation. This occurred despite the fact that both distributions resembled the normal curve with means close to the mid-points of their ranges. It is apparent that in the comparisons the scores for levels of communication effectiveness could not be used to predict compatible conscious behavior on the part of respondents. Figure 2,3, and 4 display the frequency distribution and polygon of DT2's and the frequency polygon of QT's.

That the correlation analysis should have shown this result raises some doubts. It would seem to hold intuitively that if respondents' behavior showed a certain level of similarity in one area they should also to some extent in another. The most obvious explanation for the present phenomenon is that while the semantic differential comparisons were measuring communication effectiveness for some concepts the questionnaire comparisons involved measurements of others and the two sets were not themselves sufficiently similar to provide a basis for correlation. It would, therefore, be unfortunate to assume that no such correlation potential does exist based on the results of this study; and, conclusions should be reserved until such future time as another more exhaustive research can be made.

Effective Communication

Comparing each person's semantic differential measurements of meaning with those of every other person resulted in the following statistics. The mean number of average deviations less than or equal to 1.20 (DT1) per

FREQUENCY DISTRIBUTION OF COUNTS PER COMPARISON OF AVERAGE DEVIATIONS LESS THAN OR EQUAL TO 1.40 FOR THE ENTIRE SAMPLE

(Total Number of Comparisons = 2016)

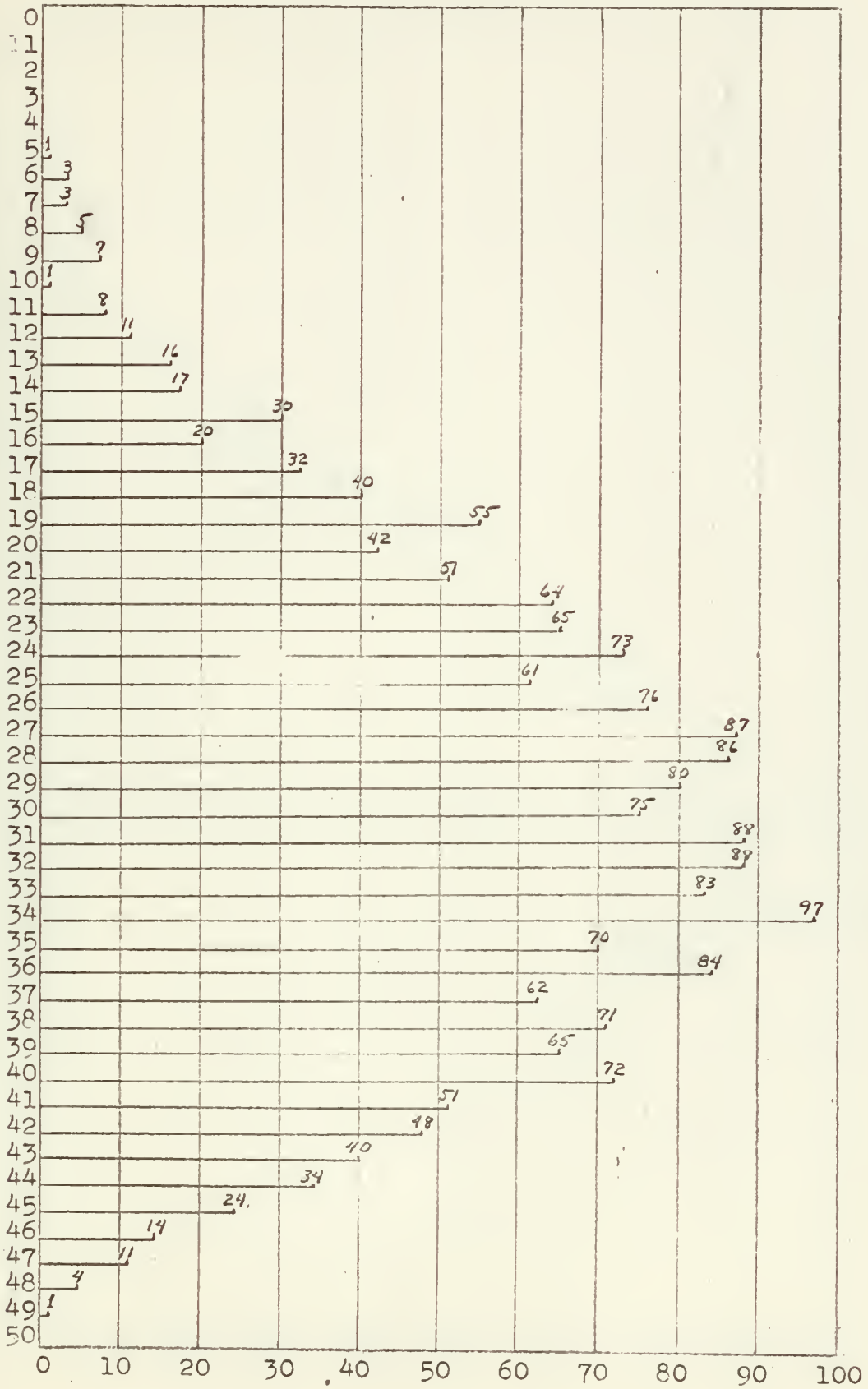

FIGURE 2

FREQUENCY POLYGON OF COUNTS PER COMPARISON OF AVERAGE DEVIATIONS LESS THAN OR EQUAL TO 1.40 FOR THE ENTIRE SAMPLE

(Total Number of Comparisons = 2016)

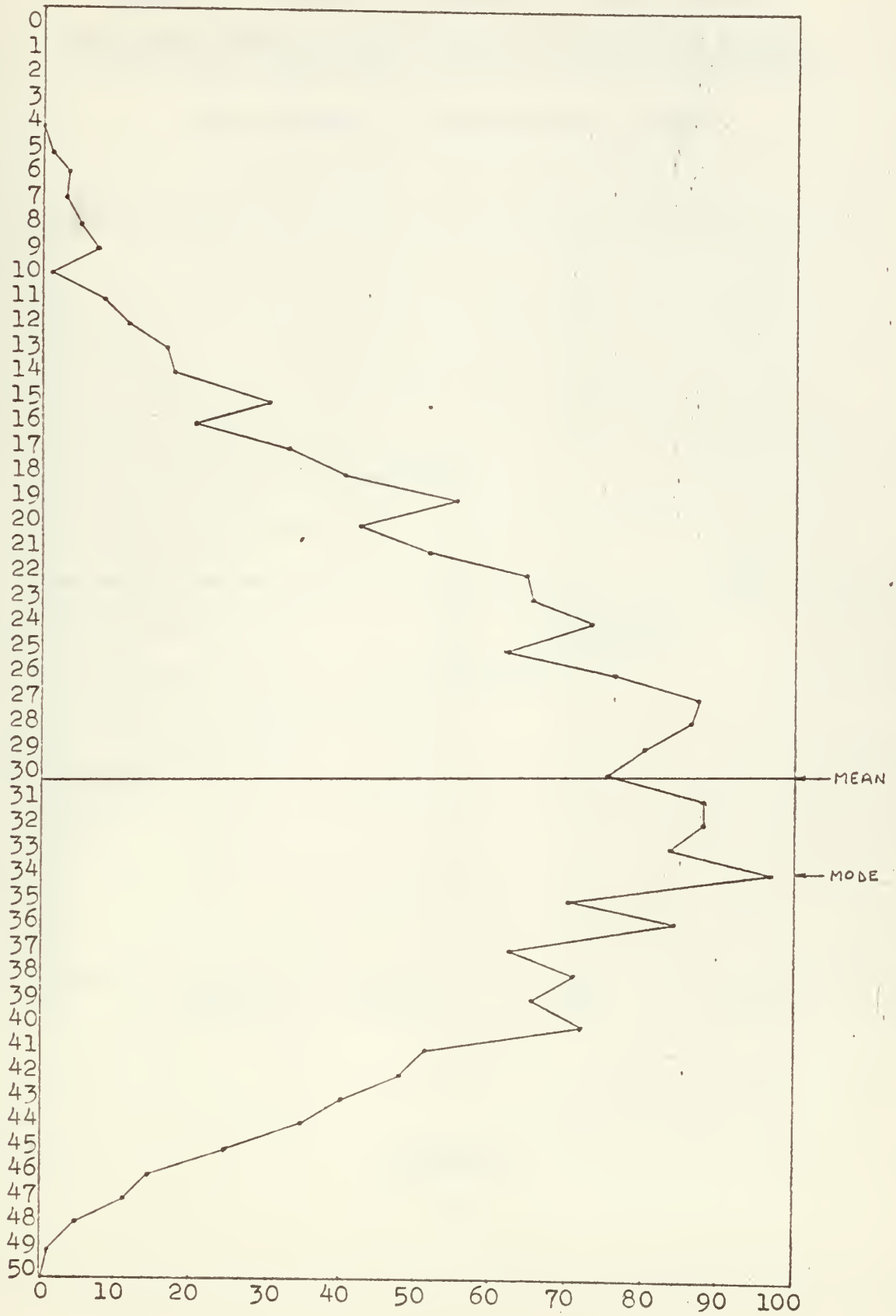

FIGURE 3

FREQUENCY POLYGON OF COUNTS PER COMPARISON OF QUESTIONS ANSWERED THE SAME FOR THE ENTIRE SAMPLE

(Total Number of Comparisons = 2016)

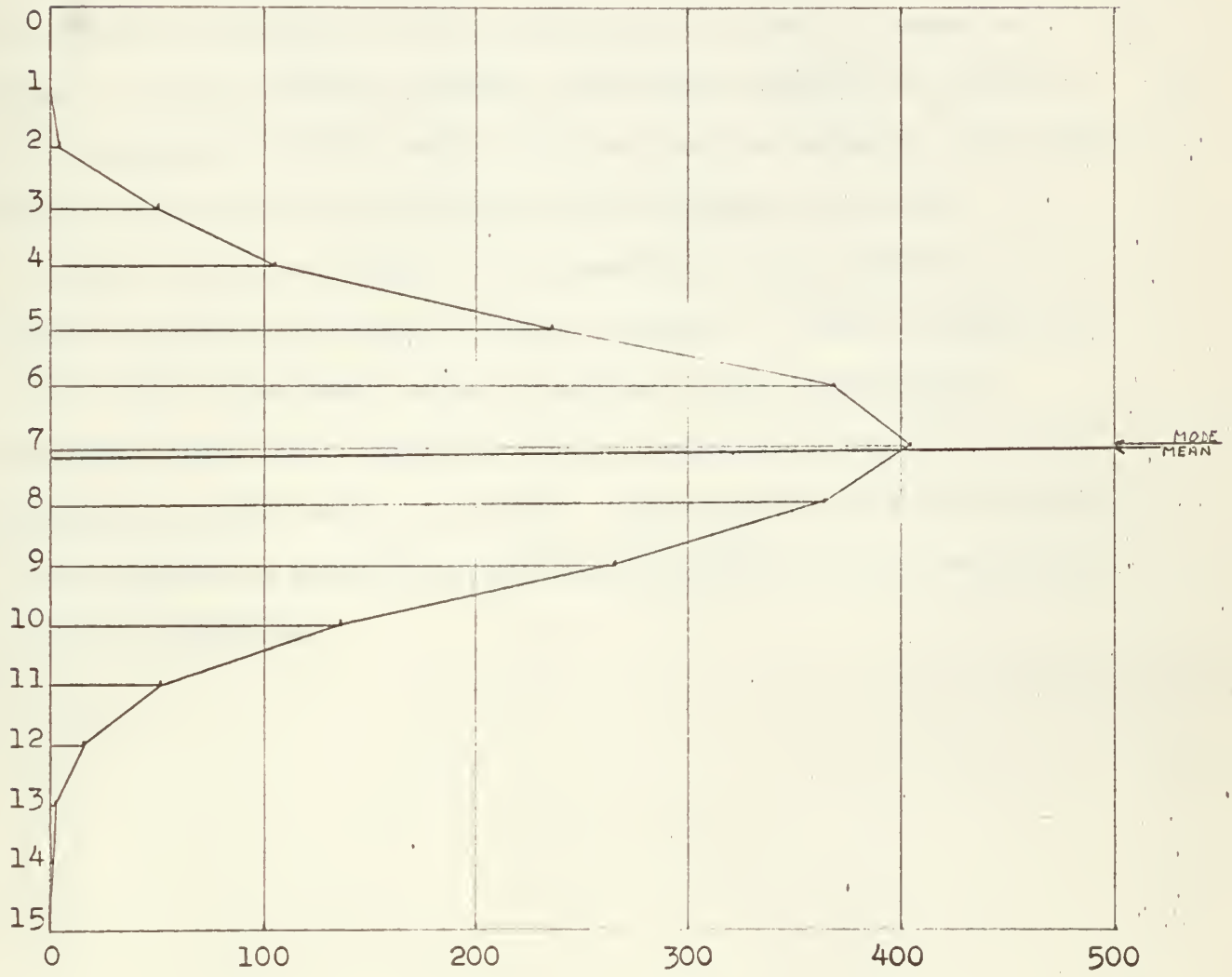

FIGURE 4

comparison was 22.14 with a standard deviation of 8.34. In other words, with a range of possibilities from 0 to 50, the average number of words with which any two persons could communicate effectively with each other was 22.14. Figure 5 shows the frequency distribution of DTl's and Figure 6 displays the frequency polygon. The DTl which occurred most often (mode) was 20 and the highest DTl was 45 and occurred in just one comparison. Figure 7 is the cumulative frequency distribution graphing the frequency of occurrences of the DTl's equal to or less than any given DTl. This shows the distribution to be approximately normal between .10 and .90.

Table I lists the results of the comparisons between officers in the various categories according to the DTl criterion. It may be surprising to note that no particular scheme is apparent except that Division Commanders stand out as exhibiting the most effective communication while Commanding Officers exhibit the least. This breakdown shows also that just as the mean DTl is below 50% so also are the means of all but two of the category comparisons.

FREQUENCY DISTRIBUTION OF COUNTS PER COMPARISON OF AVERAGE DEVIATIONS LESS THAN OR EQUAL TO 1.20 FOR THE ENTIRE SAMPLE

(Total Number of Comparisons = 2016)

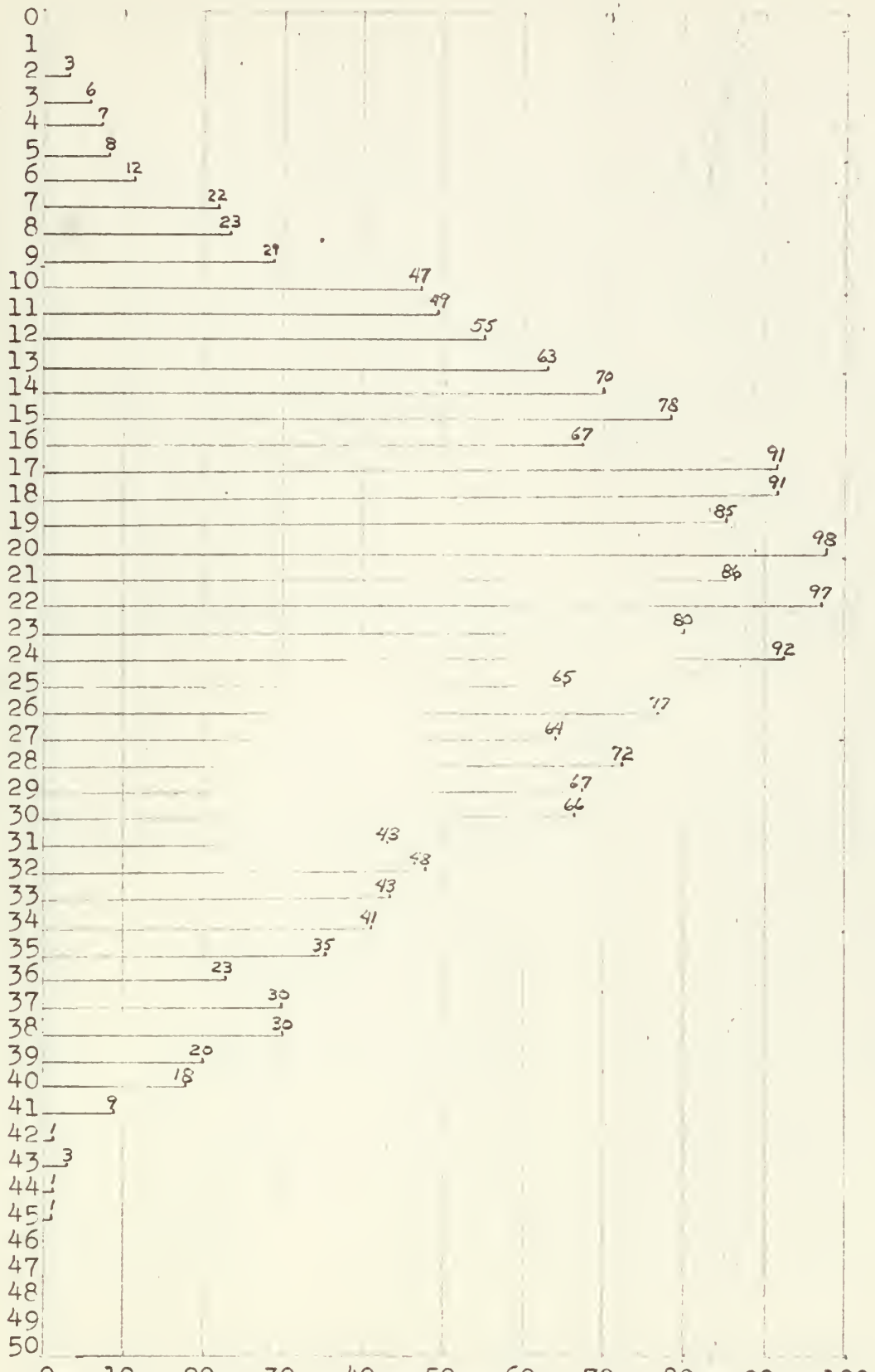

FIGURE 5

FREQUENCY POLYGON OF COUNTS PER COMPARISON OF AVERAGE DEVIATIONS LESS THAN OR EQUAL TO 1.20 FOR THE ENTIRE SAMPLE

(Total Number of Comparisons = 2016)

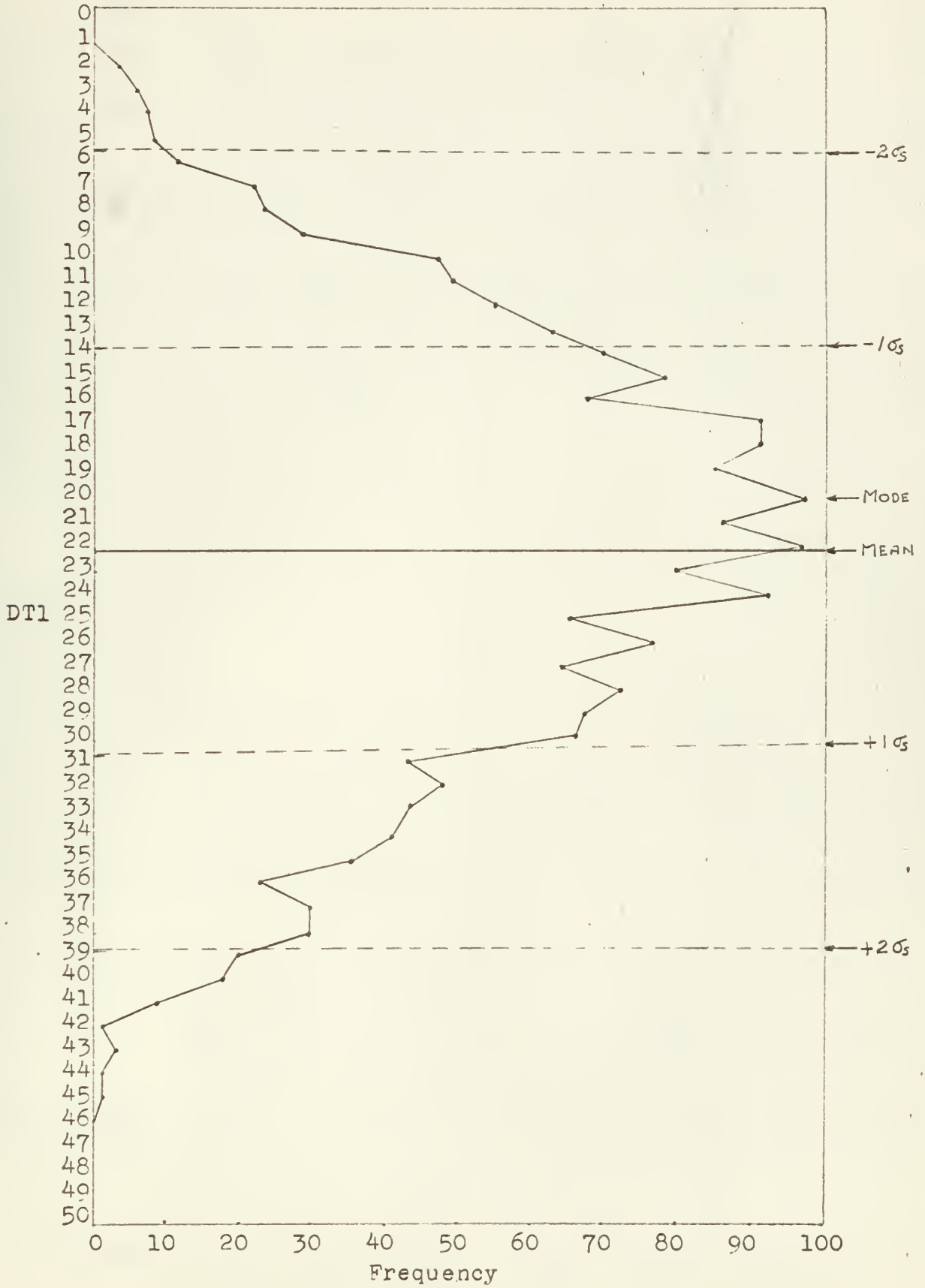

FIGURE 6

CUMULATIVE FREQUENCY DISTRIBUTION OF DT1's

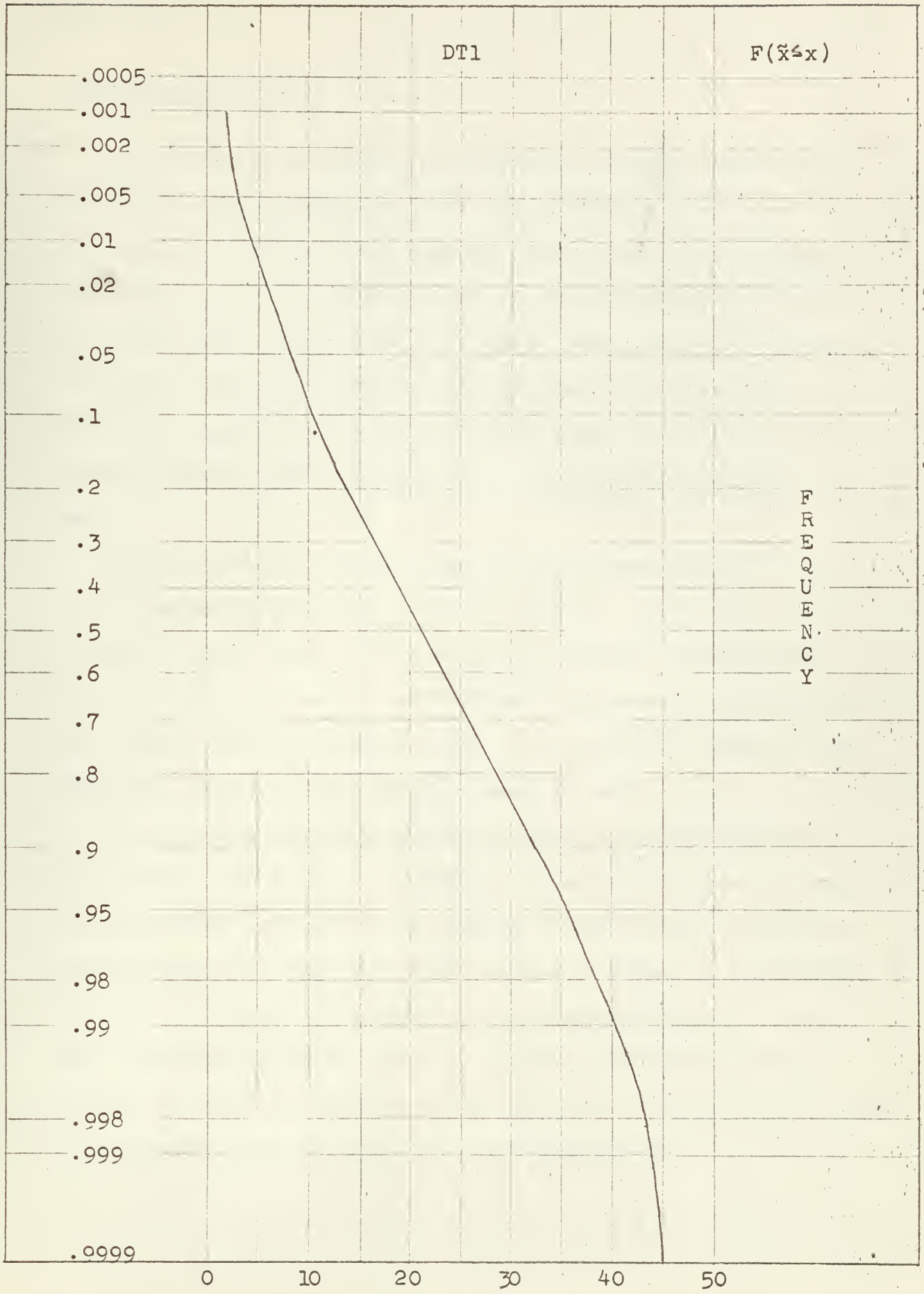

FIGURE 7

Deficient Communication

The mean number of concepts per comparison in which communication deficiencies (DT3) existed was 11.33, with a standard deviation of 7.13. This means that on the average when two persons communicate using the fifty terms, over eleven will not mean the same thing to both of them. With these eleven (plus) words it is highly likely that no real communication will take place. Graphic presentations of this distribution are provided in Figures 8, 9, and 10. These show the distribution to be heavily skewed such that the DT3's tend to preponderate under the left tail.

Table II lists the results of comparisons between officers in the various categories according to the DT3 criterion. This table, compared to Table I, shows that, as would be expected, levels of communication deficiency generally tend to vary inversely with communication effectiveness. Again, Division Commanders show the least amount of communication difficulty while Commanding Officers showed the most.

Table III displays the breakdown within the categories according to the DT1 and DT3 criteria. Ranking in Column I is in decreasing order of effectiveness; and, shows the standings within an entire category as well as within sub-categories as does ranking in Column II, which differs in that it is in increasing order of communication deficiency. It can be seen from this Table that there is no significant difference between officers on staffs and officers serving in ships. The latter were slightly less effective and more deficient in their communication.

FREQUENCY DISTRIBUTION OF COUNTS PER COMPARISON OF AVERAGE DEVIATIONS EQUAL TO OR GREATER THAN 1.70 FOR THE ENTIRE SAMPLE

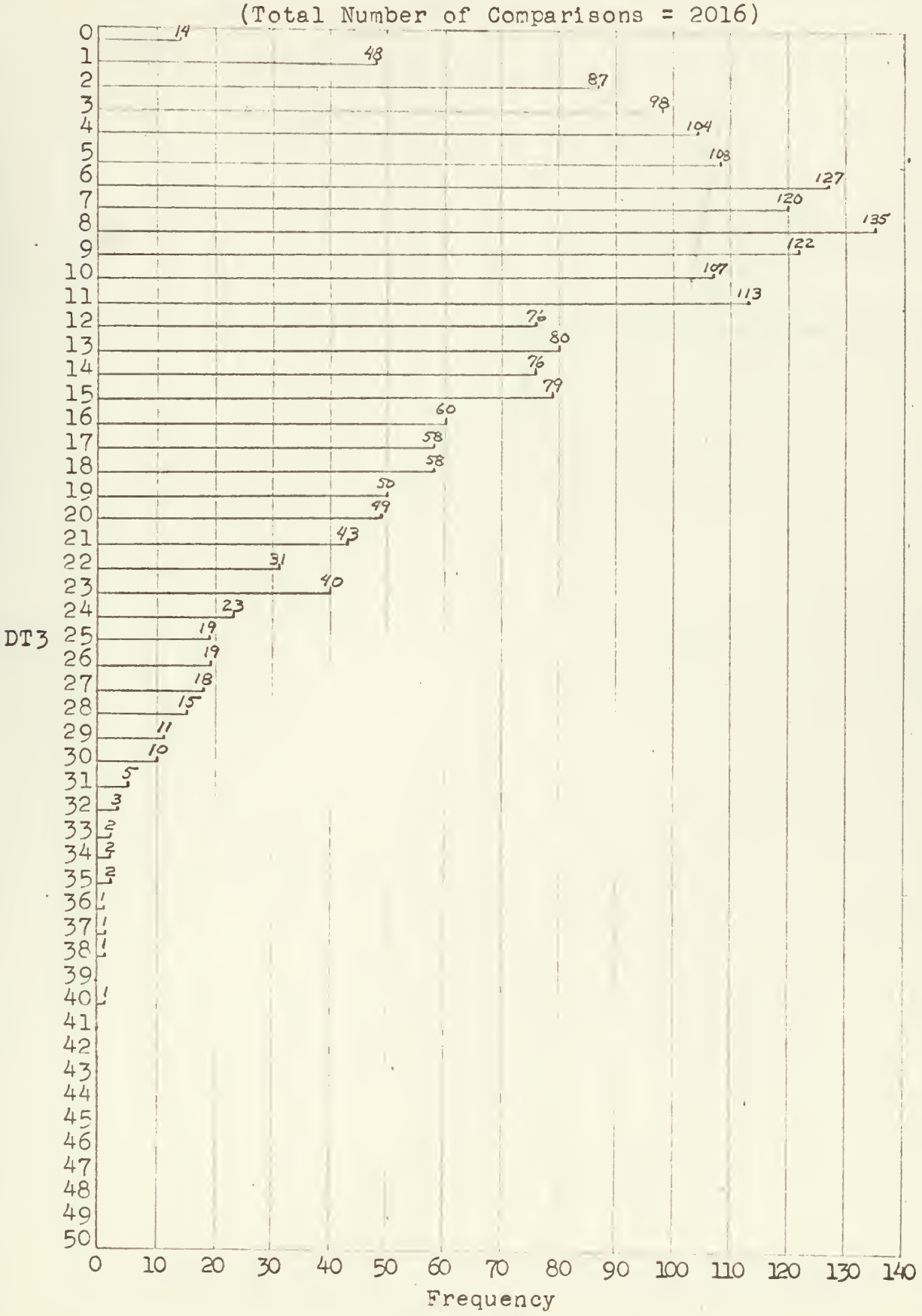

FIGURE 8

FREQUENCY POLYGON OF COUNTS PER COMPARISON OF AVERAGE DEVIATIONS EQUAL TO OR GREATER THAN 1.70 FOR THE ENTIRE SAMPLE

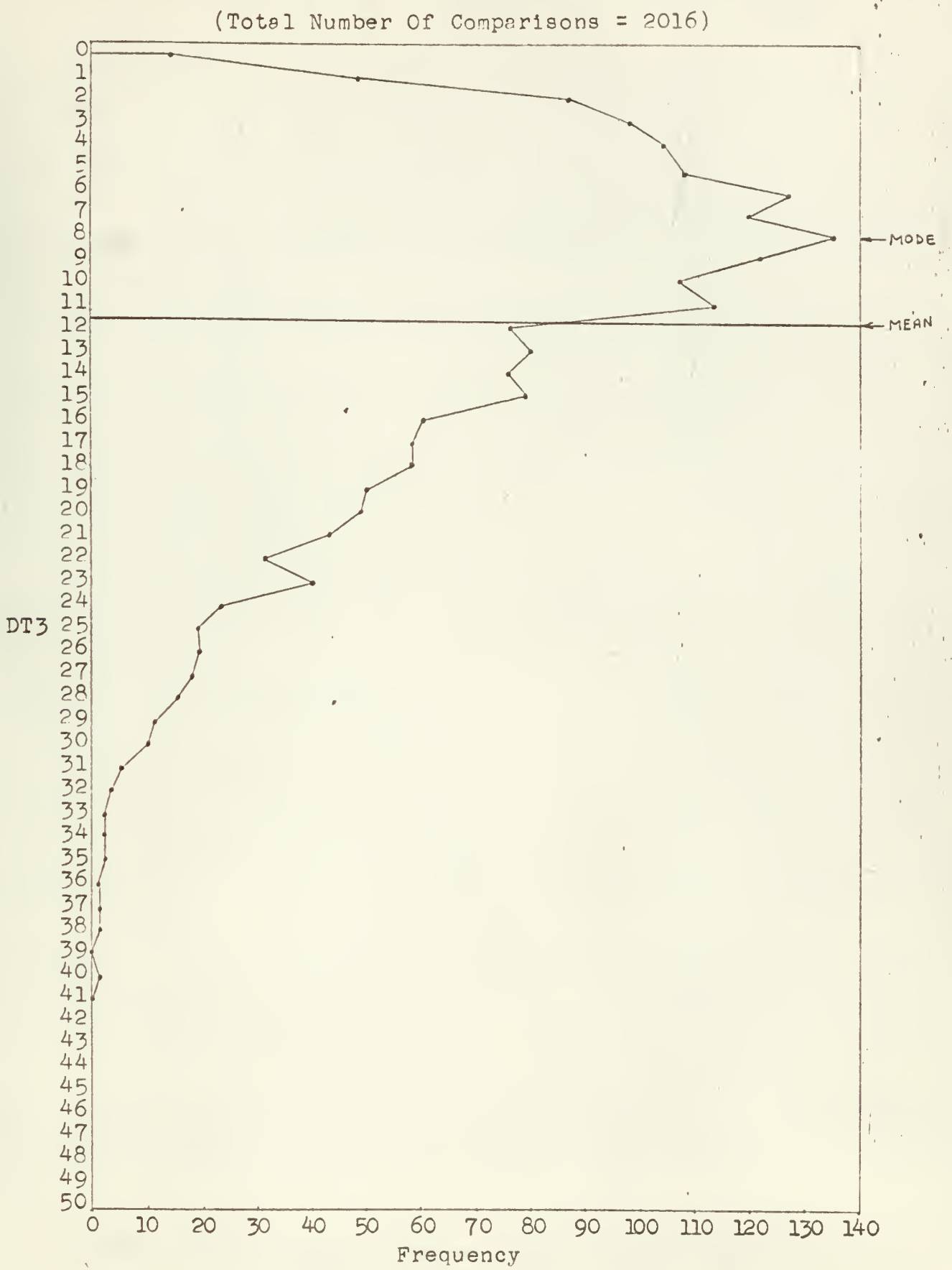

FIGURE 9

CUMULATIVE FREQUENCY DISTRIBUTION OF DT3's

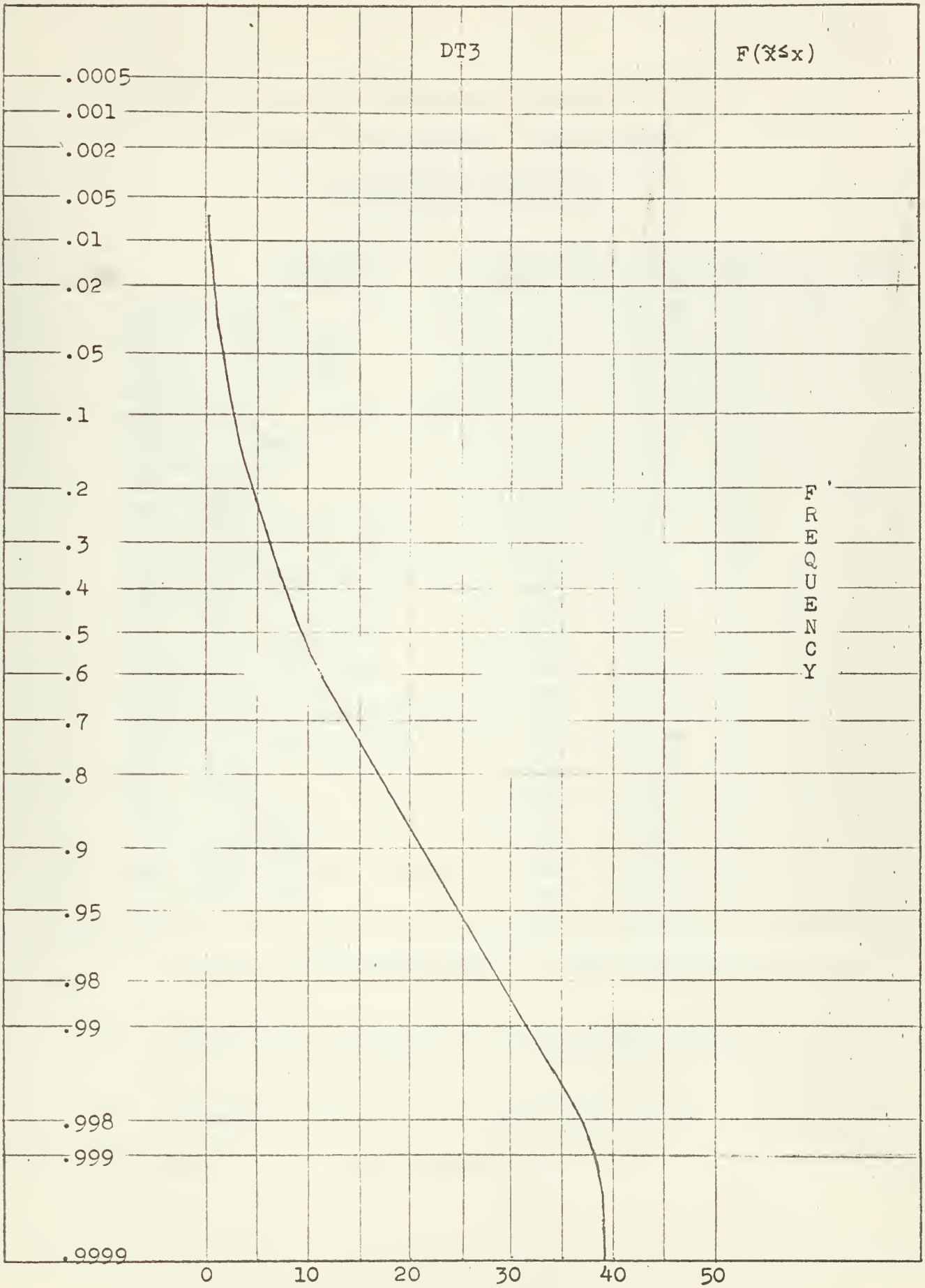

FIGURE 10

RESULTS OF SEMANTIC DIFFERENTIAL COMPARISON SHOWING

LEVELS OF COMMUNICATION EFFECTIVENESS

FOR THE VARIOUS CATEGORIES

RANK*	CATEGORIES COMPARED	NUMBER OF COMPARISONS	MEAN** SCORE	MODAL*** SCORE	RANGE	STD** DEV.
1	DIVCOM to DIVCOM	15	27.80	30	17-39	6.95
2	DIVCOM to OTHER FLEET	162	25.03	23	8-43	8.32
3	DIVCOM to OTHER STAFF	96	24.64	17	6-41	8.85
4	CAPT/CDR to CAPT/CDR	78	24.53	17	8-44	8.84
5	DIVCOM to CO	90	23.71	13	6-39	8.26
6	PRESENT STAFF to PRESENT STAFF	231	23.26	25	4-44	8.51
7	CAPT/CDR to LCDR	273	23.21	22	2-43	9.12
8	CAPT/CDR to LT/LTJG	390	23.08	20	4-41	7.77
9	USNA to USNA	741	22.73	20	2-45	8.78
10	OTHER FLEET to OTHER FLEET	351	22.68	24	3-41	7.84
11	STAFF NEVER to STAFF NEVER	300	22.38	24	3-45	8.36
12	PRESENT STAFF to PRESENT FLEET	924	22.33	22	2-43	8.27
13	UNTRAINED to UNTRAINED	1,225	22.27	18	3-45	7.89
14	OTHER STAFF to OTHER FLEET	432	22.24	21	3-41	7.89
15	STAFF EVER to STAFF NEVER	975	22.12	20	3-43	8.41
16	USNA to OTHER SOURCES	975	22.11	20	2-43	8.13
17	STAFF EVER to STAFF EVER	741	22.06	22	2-44	8.23
18	TRAINED to UNTRAINED	700	22.01	22	2-41	8.87
19	PRESENT FLEET to PRESENT FLEET	861	21.63	24	2-45	8.32
20	OTHER STAFF to OTHER STAFF	120	21.58	25	4-44	7.99
21	LT/LTJG to LT/LTJG	435	21.55	20	4-40	7.12
22	LCDR to LCDR	210	21.52	17	2-45	9.29
23	LCDR to LT/LTJG	630	21.40	24	2-43	8.54
24	TRAINED to TRAINED	91	21.34	26	2-44	9.72
25	CO to OTHER FLEET	405	21.15	24	3-45	8.62
26	OTHER SOURCES to OTHER SOURCES	300	20.78	24	3-40	7.69
27	CO to OTHER STAFF	240	20.17	22	2-41	8.29
28	CO to CO	105	19.98	17	2-40	8.30

* Ranking is in decreasing order of intra-category communication effectiveness.

** These are the averages which resulted while there was a total possible score of 50.

*** The mode is that particular score which occurred the most frequently.

**** STD. DEV. is standard Deviation.

TABLE I

RESULTS OF SEMANTIC DIFFERENTIAL COMPARISONS SHOWING

LEVELS OF COMMUNICATION DIFFICULTY

FOR THE VARIOUS CATEGORIES

RANK*	CATEGORIES COMPARED	NUMBER OF COMPARISONS	MEAN** SCORE	MODAL*** SCORE	RANGE	STD** DEV.
1	DIVCOM to DIVCOM	15	7.60	5	0-15	4.29
2	CAPT/CDR to CAPT/CDR	78	8.05	5	0-21	4.68
3	DIVCOM to OTHER STAFF	96	8.39	6	0-23	5.51
4	PRESENT STAFF to PRESENT STAFF	231	9.19	5	0-26	5.47
5	DIVCOM to OTHER FLEET	162	9.47	7	0-27	6.23
6	CAPT/CDR to LT/LTJG	390	9.85	6	0-27	5.42
7	OTHER STAFF to OTHER STAFF	120	10.02	8	1-26	5.43
8	OTHER STAFF to OTHER FLEET	432	10.49	8	0-34	6.31
9	USNA to USNA	741	10.77	7	0-38	7.01
10	UNTRAINED to UNTRAINED	1,225	10.86	8	0-32	6.42
11	LT/LTJG to LT/LTJG	435	10.92	8	0-30	5.78
12	OTHER FLEET to OTHER FLEET	351	10.96	8	0-30	6.71
13	PRESENT STAFF to PRESENT FLEET	924	11.00	7	0-36	6.85
14	DIVCOM to CO	90	11.21	7	1-30	7.28
15	STAFF EVER to STAFF NEVER	975	11.29	8	0-40	7.13
16	CAPT/CDR to LCDR	273	11.31	7	0-34	7.75
17	STAFF NEVER to STAFF NEVER	300	11.36	8	0-30	7.29
18	STAFF EVER to STAFF EVER	741	11.38	5	0-38	7.08
19	USNA to OTHER SOURCES	975	11.42	8	0-40	7.15
20	TRAINED to UNTRAINED	700	11.96	6	0-40	7.95
21	PRESENT FLEET to PRESENT FLEET	861	12.27	10	0-41	7.65
22	LCDR to LT/LTJG	630	12.31	8	0-38	7.85
23	OTHER SOURCES to OTHER SOURCES	300	12.40	11	0-33	7.27
24	TRAINED to TRAINED	91	12.82	5	0-37	8.87
25	CO to OTHER FLEET	405	12.83	7	0-40	7.98
26	CO to OTHER STAFF	240	12.86	11	0-36	7.59
27	LCDR to LCDR	210	13.23	10	0-40	8.88
28	CO to CO	105	14.47	10	1-37	8.50

* Ranking is in increasing order of intra-category communication difficulty.

** These are the averages which resulted while there was a total possible score of 50.

*** The mode is that particular score which occurred the most frequently.

** STD. DEV. is Standard Deviation.

TABLE II

BREAKDOWN OF COMPARISONS

Column I - Mean Scores for Communication Effectiveness

Column II - Mean Scores for Communication Dificulty

	I	RANK	II	RANK
CATEGORY 1				
Officers presently serving on staffs compared to:				
a. Each other	23.26	1	9.19	1
b. Officers presently serving in ships.	22.33	2	11.00	2
Officers presently serving in ships compared to:				
a. Each other	21.63	3	12.27	3
b. Officers presently serving on staffs.	22.33	2	11.00	2
CATEGORY 2				
Division Commanders compared to:				
a. Each other	27.80	1	7.60	1
b. Commanding Officers	23.71	4	11.21	7
c. Staff officers other than DIVCOM's	24.64	3	8.39	2
d. Fleet officers other than CO's.	25.03	2	9.47	3
Commanding Officers compared to:				
a. Each other	19.98	10	14.47	10
b. Division Commanders	23.71	4	11.21	7
c. Staff officers other than DIVCOM's	20.17	9	12.86	9
d. Fleet officers other than CO's.	21.15	8	12.83	8
Staff officers other than DIVCOM's compared to:				
a. Each other	21.58	7	10.02	4
b. Division Commanders	24.64	3	8.39	2
c. Commanding Officers	20.17	9	12.86	9
d. Fleet officers other than CO's.	22.24	6	10.49	5
Fleet officers other than CO's compared to:				
a. Each other	22.68	5	10.96	6
b. Division Commanders	25.03	2	9.47	3
c. Commanding Officers	21.15	8	12.83	8
d. Staff officers other than DIVCOM's	22.24	6	10.49	5
CATEGORY 3				
Officers who have ever had staff duty compared to:				
a. Each other	22.06	3	11.38	3
b. Officers who have never had staff duty	22.12	2	11.29	1
Officers who have never had staff duty compared to:				
a. Each other	22.06	3	11.38	3
b. Officers who have never had staff duty	22.12	2	11.29	1
Officers who have never had staff duty compared to:				
a. Each other	22.38	1	11.36	2
b. Officers who have ever had staff duty	22.12	2	11.29	1

TABLE III

	I	RANK	II	RANK
CATEGORY 4				
Officers with some training pertinent to staff duty compared to:				
a. Each other	21.34	3	12.83	3
b. Officers without such training	22.01	2	11.96	2
Officers without some training pertinent to staff duty compared to:				
a. Each other	22.27	1	10.86	1
b. Officers with such training	22.01	2	11.96	2
CATEGORY 5				
Captains and Commanders compared to:				
a. Each other	24.53	1	8.05	1
b. Lieutenant Commanders	23.21	2	11.31	4
c. Lieutenants and Lieutenants (junior grade)	23.08	3	9.85	2
Lieutenant Commanders compared to:				
a. Each other	21.52	5	13.23	6
b. Captains and Commanders	23.21	2	11.31	4
c. Lieutenants and Lieutenants (junior grade)	21.40	6	12.31	5
Lieutenants and Lieutenants (junior grade) compared to:				
a. Each other	21.55	4	10.92	3
b. Captains and Commanders	23.08	3	9.85	2
c. Lieutenant Commanders	21.40	6	12.31	5
CATEGORY 6				
Graduates of the Naval Academy compared to:				
a. Each other	22.73	1	10.77	1
b. Officers commissioned from other sources	22.11	2	11.42	2
Officers commissioned from other sources compared to:				
a. Each other	20.78	3	12.40	3
b. Graduates of the Naval Academy	22.11	2	11.42	2

TABLE III (Continued)

Concept Results

Table IV lists the results for the fifty concepts. For each is shown the percentage of the 2,016 comparisons which fell into the ranges of effectiveness and deficiency. For example, 33.8% of the 2,016 average deviations computed for ADMINISTRATION were less than or equal to 1.20 while 30.7% were equal to or greater than 1.70. The mean percentage of AVDEV's less than or equal to 1.20 for the fifty concepts was 44.28 and the mean percentage equal to or greater than 1.70 was 22.37. Fifteen concepts were communicatively effective for more than 50%, twenty-two were communicatively deficient in more than 23% of the comparisons with the other twenty-eight below that level. Table V is a listing of the concepts with their ranking according to relative effectiveness and deficiency.

Review of Results

The mean number of AVDEV's per comparison which were less than or equal to 1.20, i.e. the number of communicatively effective words, was 22.14. With a sample size of 2,016 it can be said with a 99% confidence level that the true mean of the entire population of submarine officers lies within the range from 21.71 to 22.57.

The mean number of AVDEV's per comparison which were equal to or greater than 1.70, i.e. the number of communicatively deficient words, was 11.33. The 99% confidence interval for the mean of the population is from 10.95 to 11.71.

Finally, the mean percentage of communicative effectiveness for each of the fifty concepts was 44.28, which is the same proportion as the mean of the distribution of DTl's. And, the mean percentage of communi-

cative deficiency for each of the fifty concepts was 22.37, the same proportion as the mean of the distribution of DT3's.

PERCENTAGES OF COMPARISONS IN WHICH COMMUNICATION COULD BE CONSIDERED EFFECTIVE AND DEFICIENT FOR EACH CONCEPT

	EFFECTIVE	DEFICIENT	IN BETWEEN
ADMINISTRATION	33.8%	30.7%	35.5%
AUTHORITY	73.8	2.9**	23.3
BUREAUCRACY	26.4	38.0	35.6
BY DIRECTION	52.1	13.9	34.0
CAREER	57.4	8.0	34.6
CASREP	33.6	27.4	39.0
COMMAND	77.9*	4.0	18.1
COMMITMENT	47.8	19.5	32.7
COMMUNICATION	33.7	31.7	34.6
COMPL. STAFF WORK	30.5	35.6	33.9
CONTROL	53.5	12.1	34.4
COORDINATION	47.4	15.9	36.7
COST	28.2	30.0	41.8
CRISIS	25.8	36.1	38.1
DIRECTIVE	38.6	28.1	33.3
DUTY	51.9	14.4	33.7
ESTIMATE	42.5	23.3	34.2
GOALS	50.6	19.0	30.4
HIGHER AUTHORITY	41.9	26.5	31.6
INCOMPETENCE	38.0	23.6	38.4
INDIVIDUALITY	54.8	16.2	29.0
INSPECTION	41.4	22.7	35.9
JURY RIG	31.0	34.6	34.4
LIAISON	47.4	20.0	32.6
LINE OFFICER	74.4	3.4	22.2
MISTAKE	31.6	28.1	40.3
MOTIVATION	63.7	12.0	24.3
OPERATIONS	54.6	13.5	31.9
OPTAR	29.9	35.3	34.8
ORGANIZATION	48.3	19.9	31.8
PLAN	45.7	17.3	37.0
POLICY	43.8	11.4	44.8
POWER	56.7	14.7	28.6
PROMOTION	42.3	19.1	38.6
READINESS	49.9	18.8	31.3
REPORT	32.8	32.7	34.5
REPRIMAND	24.7**	34.3	41.0
REPUTATION	47.2	19.7	33.1
RESPONSIBILITY	62.0	5.0	33.0
SEA DUTY	54.2	11.6	34.2
SENIORITY	40.7	25.2	34.1
CASUALTY	27.1	42.1*	30.8
SPECIALIZATION	37.0	29.1	33.9
STAFF	36.3	33.3	30.3
STAFF OFFICER	39.6	32.0	28.4
SUPPLY OFFICER	38.0	33.1	28.9
TEAM	56.7	12.2	31.1
THE FUTURE	47.5	18.7	33.8
TRAINING	42.4	25.1	32.5
WAR	28.8	36.7	34.5

* Highest

TABLE IV

** Lowest

RANKING OF CONCEPTS IN ORDERS OF EFFECTIVENESS AND DEFICIENCY

	EFFECTIVENESS*	DEFICIENCY**
ADMINISTRATION	37	37
AUTHORITY	3	1
BUREAUCRACY	48	49
BY DIRECTION	13	12
CAREER	6	5
CASREP	39	32
COMMAND	1	3
COMMITMENT	18	22
COMMUNICATION	38	38
COMPL. STAFF WORK	43	46
CONTROL	12	9
COORDINATION	20	15
COST	46	36
CRISIS	49	47
DIRECTIVE	32	33
DUTY	14	13
ESTIMATE	25	27
GOALS	15	20
HIGHER AUTHORITY	28	31
INCOMPETENCE	34	28
INDIVIDUALITY	9	16
INSPECTION	29	26
JURY RIG	42	44
LIAISON	21	25
LINE OFFICER	2	2
MISTAKE	41	34
MOTIVATION	4	8
OPERATIONS	10	11
OPTAR	44	45
ORGANIZATION	17	24
PLAN	23	17
POLICY	24	6
POWER	7	14
PROMOTION	27	21
READINESS	16	19
REPORT	40	40
REPRIMAND	50	43
REPUTATION	22	23
RESPONSIBILITY	5	4
SEA DUTY	11	7
SENIORITY	30	30
CASUALTY	47	50
SPECIALIZATION	35	35
STAFF	36	42
STAFF OFFICER	31	39
SUPPLY OFFICER	33	41
TEAM	8	10
THE FUTURE	19	18
TRAINING	26	29
WAR	45	48

* In decreasing order of effectiveness

** In increasing order of deficiency

TABLE V

CHAPTER V

SUMMARY AND CONCLUSIONS

It was the purpose of this study to detect through empirical research the existence of any conditions detrimental to optimum functioning of the Submarine Force, U. S. Pacific Fleet in the interaction of its personnel. Focusing on communication as a vital factor in the organization, measurements of the meanings to sixty-four officers of fifty common concepts through the device of Semantic Differential were made. It was felt that such indices of meaning could be used to determine levels of existing communication effectiveness which could indicate the presence of any related problems.

The measurements of each officer were compared to those of every other officer to determine whether the relative similarity or dissimilarity of meanings were sufficient to show the presence of communication effectiveness or deficiency. In each of the 2,016 such comparisons the average deviations for each concept within the range of equal to or less than 1.20 and 1.40 and equal to or greater than 1.70 were counted. From these counts the three distributions of DT1, DT2, and DT3 were computed with results as have been described. Officers in six mutually inclusive categories were compared with each other according to their subcategories to determine a series of mean DT1 and DT3 scores which would indicate where potential problems, if any, might lie. And, percentage levels of communication effectiveness and deficiency were computed for each of the fifty concepts to point out which provided the most and the least trouble.

In the judgment of the writer, based on the results of this study, the state of inter-personal communication in the Submarine Force, Pacific is such that the functioning of the organization must be in some way

adversely affected. It seems improbable that the quite low level of effective communication found, especially with the particular concepts used in the study, could exist without causing an amount of confusion, frustration, diverse behavior, or mis-directed effort sufficient to fully prevent optimal overall performance. That over eleven of the fifty concepts should on the average be so dissimilar in their meanings to any two people that in their use lack of communication is **virtually** assured seems to indicate that the maximum tolerance limit has been reached if not exceeded.

The eleven most troublesome concepts were:

Casualty (Shipboard Equipment)	Jury Rig
Bureaucracy	Reprimand
War	Staff
Crisis	Supply Officer
Completed Staff Work	Report
OpTar	

with one or two possible exceptions these terms are in daily use throughout the Force; and yet, it is found that of the comparisons over 34% were in substantial disagreement as to the meaning of the least troublesome of the eleven.

Why the results were so unfavorable is at this stage open to conjecture. Perhaps the problem lies in diverse education as indicated in Category Six or in different levels of experience and rank as indicated in Category Five. It may be that different types of duty in the Force or elsewhere in the Navy prior to entering upon submarine duty establish a variety of outlooks too disparate to permit homogeneous behavior. However, there is little **doubt** that, whatever its source or extent, a problem does exist.

RECOMMENDATIONS

Whatever is to be done to define and eliminate the problems referred to by this study must be determined by those administering the organization. Alternative courses of action must be considered along with all demands upon the resources available and judged according to the utility seen in their execution. And, it may be that no such judgment will be forthcoming. Nevertheless, the following suggestions apply.

It would be necessary to verify the results of the study through the tests of hypotheses with further sampling of smaller scale. Perhaps in the process an outline of problem sources could be described. Following this, assuming verification, a standard of performance could be established along with valid and reliable means of measuring activity to see if those standards can be met as well as tracing the roots of inhibitive factors. This is conceived to be a long run, arduous process with such an uncertain pay-off that it is doubtful that a decision to elect that course would be made.

Still, certain questions may be asked and probed at any level. For instance, why is it that Commanding Officers demonstrated such low levels of intra-group communication effectiveness? Could such a phenomenon be a function of their particular position with its special responsibilities and extra pressure? Is there some explanation for the fact that officers who had had some education applicable to staff duty fared relatively less well than those who had none? And, what is it about Division Commanders that enabled them to develop mean scores so much higher than those in the other functional sub-categories of Category Two?

An even more immediate course of action would be to make the situation generally well known and advise personnel to exercise caution in their use

of abstractions and charged terminology. Policy statements and directives could be perused to check clarity and freedom from the ambiguity which may surround terms. Finally, it would be well for all, as they deal with one another from day to day, to keep in mind the dictum of Voltaire,

"If you would speak with me, sir, first
define your terms!"

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